

TABLE OF CONTENTS

- o [Introduction](#)
 - o [CD Contents](#)
 - o [Getting Started](#)
 - o [General Notes For Use Of GIS Data](#)
 - o [Contents Of The GIS Data](#)
 - o [WY-GAP ArcView Interface Installation](#)
 - o [APPENDIX 1: Obtaining And Using GAP Data](#)
 - o [APPENDIX 2: GAP CD User Response Form](#)
-

INTRODUCTION

Thank you for obtaining this Gap Analysis Program CD. GAP is a large and complex biodiversity assessment program active throughout the U.S. and in several other countries. The information found on this CD represents several years of work and the participation of many researchers and cooperating agencies and institutions. It contains data and information that has never before existed, and like all map abstractions of the real world it is not perfect, but allows many opportunities for research, land management, conservation planning, business applications, and education. A list of appropriate and inappropriate uses is provided in "[Appendix](#)

1" of this document, but we stress that no decisions should be made solely on the use of this data; field confirmation is highly recommended. We hope you find the information valuable for your particular use and we would like to hear about all applications of the data at the address in "Appendix 2" of this document. Finally, we hope that using this CD stimulates your desire to either continue to partner with GAP or become a new cooperator in future updates and improvements.

CD CONTENTS

This CD set contains the Geographic Information System (GIS) data and Final Report for the Wyoming Gap Analysis Project (WY-GAP). If you are new to using GIS data, see "Appendix 1" of this document.

The final report describes the methods used to produce the data, accuracy statements about the data, results of data analysis, and data limitations. It is provided in Adobe Acrobat format (PDF format) along with reader software for popular platforms (see "Getting Started"). Additional readers for other platforms can be obtained for free over the Internet at: <www.adobe.com/prodindex/acrobat/readstep.html>. The report also contains graphic images of some or all of the map data.

This product supersedes all previous releases. To download updates or corrections to this product, go to the "Products" section of the National GAP Web Site at: <www.gap.uidaho.edu/gap> and follow the hypertext links to the title of this product or search for the title name.

GETTING STARTED

What You Need To Use This CD

The final report should operate readily on any modern computer with current operating software. The final report is in PDF format and requires Adobe Acrobat Reader to view. To install the Reader that is packaged with this product, follow step one and two below. If you already have Adobe Acrobat installed on your system and would like to use your current Reader, skip step one and follow the simple instructions in step two.

Step 1: Installing Adobe Acrobat Reader

- o Insert the GAP CD into your CD-ROM drive and open the CD volume.
- o Open the folder named "Readers". Depending on which operating system you are using (MacOS or Windows)*, open the "Mac" or "Win..." folder respectively. Refer to the following table to choose which folder location and subsequent installation file you need to run:

Operating System*	File	Folder Location
Macintosh	"Acrobat Installer"	\Readers\Mac
Windows 3.xx	"rs16e301.exe"	\Readers\Win31
Windows 95/NT	"ar40eng.exe"	\Readers\Win95NT

* Other operating system versions of Adobe Acrobat Reader can

be downloaded over the Internet at the following URL address:
<www.adobe.com/prodindex/acrobat/readstep.html>

- o Quit all running applications.
- o Double-click the appropriate installation file (Mac or Windows).
- o Follow the instructions on your screen.

IMPORTANT: If there is a failure at any point during the installation of Acrobat Reader, the installer performs a complete uninstall. For this reason, it is important not to close the installer application by clicking the close box of the background window after clicking the "Thank You" dialog box that appears at the end of the installation. If you wait for a second or two, the installer will automatically close the background windows after the installation is complete.

If you are having trouble installing, read Adobe's technical troubleshooting guide on the Internet at the following URL:
<www.adobe.com/supportservice/custsupport/SOLUTIONS/93da.htm>

Step 2: Running the program and reading the final report.

- o Insert the GAP CD into your CDROM drive and open it.
- o Open the "Start" folder.
- o Double click on the "report.pdf" file. Acrobat Reader will automatically be launched and the "report.pdf" file will be loaded.

If for some reason, Acrobat Reader will not launch automatically, you can also manually start Adobe Acrobat Reader by double-clicking the Acrobat Reader icon that is installed on your system. Once Acrobat

Reader is running, choose "OPEN" from the "FILE" menu, and select the "report.pdf" file from the "Start" folder on your CD_ROM drive. In both cases, the State's Final Report Cover Page will appear on the screen once successfully loaded.

GENERAL NOTES FOR USE OF THE GIS DATA

This CD set was produced on a Windows NT platform by the University of Wyoming's Spatial Data and Visualization Center <www.sdvc.uwyo.edu>, for the Wyoming Bioinformation Node, a cooperative project between the University of Wyoming and the National Gap Analysis Program <www.gap.uidaho.edu/gap>. It has been tested on MacIntosh and Unix platforms. However, data in ARC/INFO format and ArcView shape files may not be readable directly from CD by ArcView or ARC/INFO users on Mac or Unix platforms. If the data is not readable from CD, please copy the directories to the hard disk drive for use.

o General Notes for Disc 1 of 2:

Disc one contains two of the three main data-sets produced by WY-GAP: vegetation and land stewardship.

Disc one also contains a customized ArcView interface for accessing the WY-GAP data. This interface requires access to ArcView 3.x on a Windows or Unix system (it will not function on a MacIntosh system). It requires the JFIF (JPEG) reader extension which comes with ArcView 3.x versions. The interface will NOT work with the 3D Analyst extension activated. More information about the interface is included in the "[WY-GAP ArcView Interface Installation](#)" section of this document as well as the "wbntool.doc" file in the "GISData" directory of this CD, including installation instructions.

o General Notes for Disc 2 of 2:

Disc two contains the third data-set: vertebrate species distributions. It is composed of 445 individual ARC/INFO GRID (raster format) coverages for all 445 vertebrate species mapped by WY-GAP. These coverages were converted from polygon format to raster format at 100 meter pixel resolution.

The grids were named using the element code for each species. The element code is a unique 10 digit (5 letters followed by 5 numbers) string assigned to each species. The first 3 digits of the element code designate the directory in which the grid resides. The remaining 7 digits denote the grid name. For example, the Common Loon, *Gavia Immer*, has an element code of ABNBA01030. Its grid would be found in the ABN directory and would be named BA01030. See the spreadsheet "wyvert.xls" or the comma delimited text file "wyvert.csv" for a list of species and their element codes.

CONTENTS OF THE GIS DATA

The GIS Data is provided under the directory named "GISData" on each CD. The contents of each are described below.

GIS Data Contents (Disc 1 of 2):

"GISData" Directory:

wbn.apr: The ArcView ".apr" file that runs an interface

customized for the Wyoming Gap Analysis data (see ["WY-GAP ArcView Interface Installation"](#)).

wbntool.doc: A text document describing the ArcView interface that has been customized for the Wyoming Gap Analysis data.

wyvegman.doc: manual for the land cover data in text file format.

Subdirectories Within the "GISData" Directory:

arcdata: contains statewide datasets in ARC/INFO format (vector coverages and raster grids).

habitat: HTML documents of habitat information for all species. This directory contains a REAMDE text file identifying the species codes.

images: JPEG images of all 445 species distributions. This directory contains a REAMDE text file identifying the species codes.

metadata: contains metadata in FGDC format (text) for the WYGAPVEG, WYSTWRD, WYHEX, WYHYDRO and WYROAD datasets, as well as the species database (WYSPECIES.DBF) and the species distributions and richness datasets (WYANIMAL).

referenc: HTML documents of all references for species distributions and habitat used for modeling. This directory contains a REAMDE text file identifying the species codes.

shape: contains statewide datasets in ArcView shapefile format and databases in Dbase format. Also contains additional shape files

used by the customized ArcView interface.

tool: contains additional data required to run the ArcView interface (see the "[WY-GAP ArcView Interface Installation](#)" section).

"Arcdata" Directory:

wygapveg: statewide land cover vector coverage. See metadata for description of attributes since these have not been standardized ("wygapveg.met"). Includes 10 INFO files with descriptions of all associated codes. The data is also available in 1:100,000 quad tiles in the veg_quad directory. There are also two ArcView legend files available in the interface directory. "Landcov1.avl" works on the DESCRIPT1 field, for displaying primary land cover types; "landcov2.avl" works on the DESCRIPT2 field for displaying secondary land cover types.

wystwrdr: statewide land stewardship vector coverage. See metadata for description of attributes ("wystwrdr.met"). There are also several INFO files associated with this database ("wystwrdr.own", ".sma", ".display", ".quad", ".map", and ".usfs") which can be joined to the main coverage to provide descriptions of the ownership, management unit and other associated codes in the main coverage. There is an ArcView legend file in the interface directory, for displaying the major land ownership types in this coverage. The legend file works on the DISPLAY field.

wyhex: statewide EPA hexagon vector coverage, containing locality information for each species with species items. Locality information was generalized to the hexagon level from point locality information which is not available for distribution. Also includes two INFO files,

"wyhex.src" and "wyhex.rev", which contain information about the sources for the locality information and the reviewer names who reviewed the animal distributions. See metadata ("wyhex.met").

allrich: statewide species richness map, in 100m raster (grid format). See metadata document called "wyanimal.met" for details on how the species distributions were modeled. The species data was modeled as a vector polygon coverage and the richness for all species was calculated from a hyperdistribution map of all 445 species distributions.

birdrich: richness map of 241 bird species for Wyoming in 100m raster.

mamrich: richness map of 116 mammal species for Wyoming, 100m raster.

herprich: richness map of 26 reptile and 12 amphibian species in Wyoming, 100m raster.

wydem: 90 meter digital elevation model for Wyoming in raster (GRID) format. Metadata is included (wydem.met).

GIS Data Contents (Disc 2 of 2):

"GISData" Directory:

Disc two's GIS Data contains maps of all terrestrial vertebrate distributions organized by taxonomic group (mammals, birds, and herps). See the spreadsheet, "wyvert.xls", or the comma delimited text file, "wyvert.csv", for a list of species and their element codes which can be found in the GISData Directory.

WY-GAP ARCVIEW INTERFACE INSTALLATION

This customized interface requires ArcView version 3.x, and the data directories as described below. ArcView version 3.x should include the JPEG (JFIF) reader extension, which is required to display the JPEG images used in this interface. No other extensions are required. The interface will not work with the 3D Analyst extension activated. It has been tested successful on Windows 95 and NT systems, and Unix Sun and SGI systems. It will not function on a MacIntosh system.

To start the customized interface, open the wbn.apr file (ArcView project file). This project requires three subdirectories in order to run: "tool", "images", and "shape" which are approximately 350 MG in size altogether. If the data is copied from the CD, these three directories must be subdirectories to the directory where "wbn.apr" resides. When the ".apr" file is opened, it will check to see if the directory structure is correct, and if it is not, it will warn the user that the directory structure or the location of the ".apr" file needs to be changed before the interface can be used.

Please see the documentation, "[wbntool.doc](#)", for more details about the interface, including instructions and potential limitations/bugs.

Description of the three required subdirectories:

"Shape" Directory:

- wyspecie.dbf: a dBase table containing all 445 species modeled by Wyoming GAP Analysis, including their element codes, common and scientific names, whether or not they were a GAP species, their TNC, state and federal rankings, information about their range

and mapping problems (if applicable), additional information about modeling their distribution, and the number of hectares of their habitat calculated for each of the 4 status categories. See the metadata document ("wyspecie.met").

wygapveg.shp: vegetation or land cover; also in ARC/INFO format (arcdata directory).

wystwrd.shp: land stewardship (includes ownership, management units and management status). Also in ARC/INFO format (arcdata directory).

wyhex1.shp: contains hexagon ranges for the first 223 species. One shapefile could not contain all 445 species because of the 255 field limitation.

wyhex2.shp: contains hexagon ranges for the remaining 222 species. One shapefile could not contain all 445 species because of the 255 field limitation.

wyroad.shp: roads from 1:100,000-scale TIGER data. There is an ArcView legend file, "road.avl", available for this shapefile in the "shape" directory. This legend file works with the ROADCLASS field. Dataset metadata document is called "wyhydro.met".

wylake.shp: polygon features (lakes/reservoirs/ponds) from the 1:100,000-scale USGS DLG data. There is an ArcView legend file, "lakes.avl", available for this shapefile, in the "shape" directory. This legend file works on the MINOR1 field. Dataset metadata document is called "wyhydro.met".

wystream.shp: line features (streams) from the 1:100,000-scale USGS DLG data. Includes Strahler stream order. There is an ArcView legend file, "stream.avl", available for this shapefile, in the "shape" directory. This legend file works on the

MINOR1 field. Other fields include ORDER (1-7) and PERENNIAL (1=perennial stream, 2=intermittent stream). Dataset metadata document is called "wyhydro.met".

county.shp: statewide vector coverage of Wyoming counties including state boundary, extended to include the boundary of Yellowstone National Park.

maj_road.shp: statewide vector coverage of main roads in Wyoming (1:1,000,000-scale).

maj_lake.shp: statewide vector coverage of main lakes/reservoirs (1:1,000,000-scale).

river.shp: statewide vector coverage of main rivers in Wyoming (1:1,000,000-scale).

city.shp: locations of 25 major cities/towns in Wyoming.

township.shp: townships for Wyoming (does not include sections)

quad24k.shp: 7.5 minute (1:24,000-scale) quadrangle boundaries, names and id's.

degblk.shp: degree block coverage and database for Wyoming, containing degree-block distributions for all species; this is a coarser database than the hexagon occurrence database that the species' distributions was modeled from, but contains breeding/non-breeding information for birds and mammals that was not included in the modeling.

maj_own.shp: major ownership categories (simplified from the 100+ ownership categories in the wystwr coverage).

mstatus.shp: the land stewardship coverage dissolved

into the four management status categories.

smabnd.shp: the land stewardship coverage dissolved into management units.

usfsbnd.shp: the land stewardship coverage dissolved into national forests.

scenebnd.shp: the boundaries, names and other information associated with the TM scenes used to interpret and digitize the land cover. This directory also contains these ArcView legend files: "landcov1.avl", "landcov2.avl", "landown.avl", "sma.avl", "status.avl", "forest.avl", "road.avl", "stream.avl", and "lakes.avl".

"Tool" Directory:

The WYHEX coverage containing the species' occurrence rankings was converted into "region" format to speed multi-species queries. Because of the 255 field limitation, the dataset was divided into four shape files: two for birds and one each for mammals and herptiles. Four more shape files were also created, containing only the Confirmed occurrences of each species.

Some coverages were too complex and time-consuming to be displayed within the ArcView interface, such as the species' distributions and richness maps. These vector coverages were converted to raster grids to reduce their complexity, but to make the interface available to users without the Spatial Analyst extension, which is required to load data in raster grid format, these layers were provided in image formats (either JPEG or BIL):

hillsh.bil (shaded relief)

elev12.jpg (elevation, in 12 categories)

allrich.jpg, mamrich.jpg, birdrich.jpg, herprich.jpg
(richness maps)

habitat1.dbf and habitat2.dbf: Dbase tables containing relation/no relation information for each species according to each habitat type. This table had to be broken into two tables because of the 255 field limitation for Dbase. "Habitat1.dbf" contains species AAAA01140 through ABPBR01010, and "Habitat2.dbf" contains species ABPR01030 through ARADE02123.

hex_src1 and hex_src2.dbf: species occurrence information, for linking to the "wyhex1" and "wyhex2" shape files. This table had to be broken into two tables because of the 255 field limitation for Dbase. "Hex_src1.dbf" contains species AAAA01140 through ABPBR01010, and "hex_src2.dbf" contains species ABPR01030 through ARADE02123.

vertown.dbf: a Dbase file containing all the area statistics for each species by 9 stewardship categories and the 4 status categories. Each species has 4 items, the species' element code plus 1,2,3, or 4 representing the status.

degblk.dbf: species occurrence information, for linking to the DEGBLK coverage.

hex_rev.dbf: sources and reviewers, describing the codes found in "hex_src.dbf".

species.dbf: contains species names and codes required for creating species selection menus and displaying images.

"Images" Directory:

All 445 species distributions in JPEG (JFIF) format.
Each species has two files: .JPG and .JGW. The .JGW
header file is required to view these files in ArcView.

APPENDIX 1: OBTAINING AND USING GAP DATA

Before accessing GAP data, please read the following information. The National Gap Analysis Program does not provide software or data analysis services. We recommend you contact your state universities and/or GIS library or distribution centers for such assistance. Additional suggestions are provided below.

If You Are New To GIS And Digital Spatial Data:

You will need a Geographic Information System (GIS) to use GAP data (though not the digital report, which is in a graphic form for viewing only). There are a number of resources available to provide assistance to new GIS users or those desiring GIS services. Two locations you may wish to examine for basic GIS information, products, and services are:

<www.esri.com/base/users/conservation/conservation.html>, and
<www.desktop.org/cgisc>. Your state GAP project report may also identify a service provider in your state.

Using GAP Data:

All information is created with a specific end use or uses in mind. This is especially true for GIS data, which is expensive to produce and must be directed to meet the immediate program needs. For GAP, minimum standards were set

(see Standards Chapter in the GAP Handbook) to meet program objectives. These standards include: scale or resolution, accuracy, and format. The standards are constantly evolving, and therefore projects begun previous to the date of the current standards may not meet those standards.

Recognizing, however, that GAP would be the first, and for many years likely the only, source of statewide biological GIS maps, the data were created with the expectation that they would be used for other applications. Therefore, we list below both appropriate and inappropriate uses. This list is in no way exhaustive but should serve as a guide to assess whether a proposed use can or cannot be supported by GAP data. For most uses, it is unlikely that GAP will provide the only data needed, and for uses with a regulatory outcome, field surveys should verify the result. In the end, it will be the responsibility of each data user to determine if GAP data can answer the question being asked, and if they are the best tool to answer that question.

Scale: First we must address the issue of appropriate scale to which these data may be applied. The data were produced with an intended application at the ecoregion level, that is, geographic areas from several hundred thousand to millions of hectares in size. The data provide a coarse-filter approach to analysis, meaning that not every occurrence of every plant community or animal habitat is mapped, only larger, more generalized distributions. The data are also based on the USGS 1:100,000 scale of mapping in both detail and precision. When determining whether to apply GAP data to a particular use, there are two primary questions: do you want to use the data as a map for the particular geographic area, or do you wish to use the data to provide context for a particular area? The distinction can be made with the following example: You could use GAP land cover to determine the approximate amount of oak woodland occurring in a county, or you could map oak woodland with aerial photography to determine the exact amount. You then could use GAP data to determine the approximate percentage of all oak woodland in

the region or state that occurs in the county, and thus gain a sense of how important the county's distribution is to maintaining that plant community.

Appropriate Uses: The above example illustrates two appropriate uses of the data; as a coarse map for a large area such as a county, and to provide context for finer-level maps. Following is a general list of applications:

- o Statewide biodiversity planning
- o Regional (Councils of Government or ecoregional) planning
- o Regional habitat conservation planning
- o County comprehensive planning
- o Large-area resource management planning
- o Coarse-filter evaluation of potential impacts or benefits of major projects or plan initiatives on biodiversity, such as utility or transportation corridors, wilderness proposals, regional open space and recreation proposals, etc.
- o Determining relative amounts of management responsibility for specific biological resources among land stewards to facilitate cooperative management and planning
- o Basic research on regional distributions of plants and animals and to help target both specific species and geographic areas for needed research
- o Environmental impact assessment (EIS) for large projects or military activities
- o Estimation of potential economic impacts from loss of

biological resource based activities

- o Education at all levels and for both students and citizens

Inappropriate Uses: It is far easier to identify appropriate uses than inappropriate ones, however, there is a "fuzzy line" that is eventually crossed when the differences in resolution of the data, size of geographic area being analyzed, and precision of the answer required for the question are no longer compatible. Examples include:

- o Use of the data as a "content" map for small areas (less than thousands of hectares), typically requiring mapping resolution at 1:24,000 scale and using aerial photographs or ground surveys.
- o Combining GAP data with other data finer than 1:100,000 scale to produce new hybrid maps or answer queries resulting in precise measurements.
- o Generating specific areal measurements from the data finer than the nearest thousand hectares (minimum mapping unit size and accuracy affect this precision).
- o Establishing exact boundaries for regulation or acquisition.
- o Establishing definite occurrence or nonoccurrence of any feature for an exact geographic area (for land cover, the percent accuracy will provide a measure of probability).
- o Determining abundance, health, or condition of any feature.
- o Establishing a measure of accuracy of any other data by comparison with GAP data.

- o Altering the data in any way and redistributing them as a GAP data product.
 - o Using the data without acquiring and reviewing the metadata and this report.
-

APPENDIX 2: GAP CD USER RESPONSE FORM

Thank you for obtaining this USGS/Gap Analysis Program Product. It was produced "in-house," not by a professional publisher so we'd like to take the opportunity to learn from your experience (this is entirely optional).

You may return this form to us by email to gap@uidaho.edu, by fax (208/885-3618), by mail:

GAP
530 S. Asbury St., Suite 1
Moscow, ID 83843

or online at:

<<http://www.gap.uidaho.edu/Response/CD.asp>>.

By mail simply print out this copy or fill out and print the PDF version ("[response.pdf](#)"); by email please open the "[response.txt](#)" in the "Start" folder in any word processor or notepad application, copy the text, and then paste it into your message and send. For any problems you have had, please provide a constructive suggestion on how we can make the product better. You may provide additional comments on another sheet by using the question reference number.

1. Product Title:
 2. This product was obtained from:
 3. How much did it cost to obtain the product:
 4. This product is used by (please insert the institutional affiliation or indicate private individual):
 5. If the product was a set, it was primarily obtained for:
 - (1) the final report and graphics
 - (2) the GIS data,
 - (3) both equally.
 6. I/We use the product for (please be as descriptive as possible as to what are your applications of the report and data):
 7. Did you have difficulty using the product? (explain):
 8. Did you have difficulty locating the specific information within the product that you wanted? (explain):
 9. Was the quality of the final report and graphics satisfactory? (explain):
 10. How did you find the quality of the GIS data? (explain):
 11. Did the report meet your expectations for your purposes? (explain):
 12. Did the GIS data meet your expectations for your purposes? (explain):
 13. Do you have any other recommendations and/or comments?
-